



Utilizing NASA Earth Observations to Classify Wetland Extent in Western Rwanda in Support of the United Nation's Sustainable Development Goals



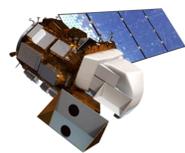
Abstract

Balancing the demands of economic development and environmental protection is a challenge which requires policy-makers to be well informed about the extent and value of key natural ecosystems. Wetlands have long been known to regulate hydrological processes, reduce erosion and flooding, safeguard local biodiversity, mitigate changes in climate, and contribute to food security. Nonetheless, due to the coupled threat of increasing population and lack of land use classification, east African wetlands face eradication if a concerted effort to identify, map, and protect these areas is not rapidly undertaken. To advance the wetland conservation efforts of the Rwanda Environmental Management Authority (REMA) and the UN's Sustainable Development Goals (SDG), a time series and land change extent model were generated to provide a baseline inventory of Rwandan wetlands and pinpoint critical areas that should be targeted for enhanced research and protection. Wetlands were identified by a supervised maximum likelihood classification conducted in Google Earth Engine using Landsat 5 Thematic Mapper (TM) and Landsat 8 Operational Land Imager (OLI) data. The TerrSet Land Change Modeler software was used to generate a forecast of the land changes predicted to occur by the year 2030. These predictive models will optimize REMA's conservation efforts of wetlands, and provide researchers with a replicable methodology that can be used to continue monitoring global wetland extent.

Project Partners

- ▶ Rwanda Environment Management Authority (REMA)
- ▶ NASA SERVIR Coordination Office at MSFC
- ▶ Regional Centre for Mapping of Resources for Development (RCMRD)
- ▶ GEO-Wetlands Initiative

Earth Observations



Landsat 8 OLI



Landsat 5 TM

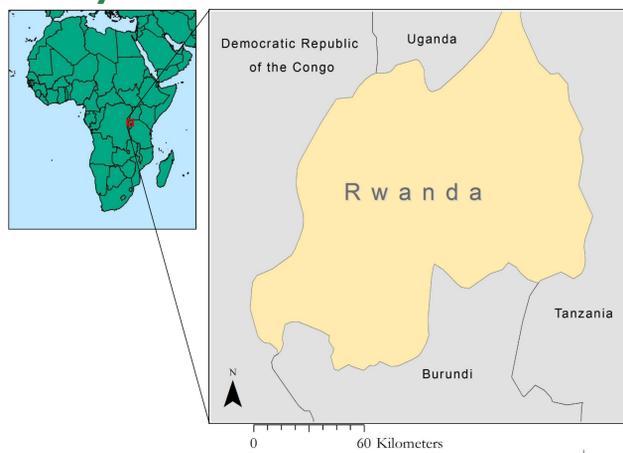


SRTM v3

Objectives

- ▶ **Identify** wetland extent throughout Rwanda utilizing the Landsat series and Google Earth Engine.
- ▶ **Enhance** project partners capabilities to allocate resources in efforts to protect wetlands.
- ▶ **Generate** accurate maps detailing wetland extent and trends.

Study Area



Study Location:
Rwanda

Study Period:
2007-2017,
Forecasting to 2030

Methodology

Data Acquisition



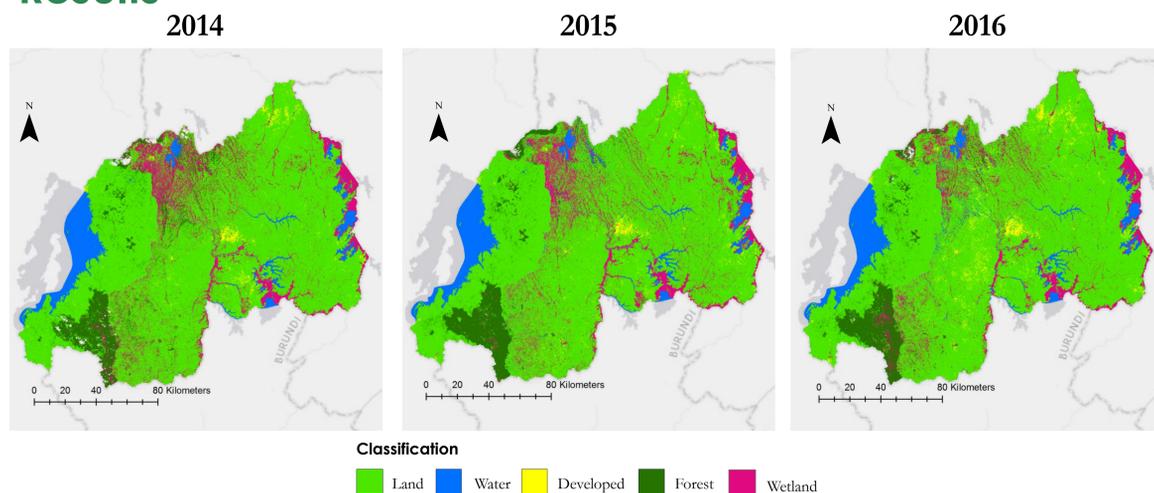
Data Analysis



End Products



Results



Conclusions

- ▶ **From** 2014 to 2016 a trend of decreasing wetland extent in eastern Rwanda.
- ▶ **Wetland** to land/cropland was most common conversion.
- ▶ **Detection** of forest loss between years highlights potential escalation in deforestation.
- ▶ **Utilizing** Landsat Series for a visual classification of wetlands in Rwanda is difficult due to cloud cover and temporal resolution.
- ▶ **Wetlands** were most prominent in eastern Rwanda.

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Team Members



Nicholas McVey
(Project Lead)



Dashiell Cruz



Jennifer Gelmis



Julia Bayer

